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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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In the Matter of)
)
Amendment of Parts 2 and)
90 of the Commission's)
Rules Relating to the)
Location and Monitoring)
Service in the)
902-928 MHz Band)

PR Docket No. 93-61

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

COMMENTS OF AMTECH CORPORATION

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TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION AND SUMMARY	1
II. STATEMENT OF INTEREST	3
III. AMTECH'S COUNTERPROPOSALS	5
A. The Commission's Proposed Band Plan Denies Sufficient Spectrum for Local-Area Systems' Existing and Future Needs	7
B. The Amount of Spectrum That the <i>NPRM</i> Would Reserve for "Wideband" Systems Only Is Unjustifiable	13
C. AMTECH's Preferred Band Plan	17
1. The Commission Should Open The Entire 902-928 MHz Band To All LMS System Types	17
2. Sharing Would Be in the Public Interest	22
D. AMTECH's Alternative Band Plan	28
E. Placement of Forward-links	31
F. Power, Height and Emission Restrictions and Requirements of Robustness	33
G. Provisions for Extended Implementation	35
IV. EXISTING LICENSEES SHOULD BE PERMITTED TO STAY ON THE SAME FREQUENCIES	36
CONCLUSION	38

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AMTECH Corporation ("AMTECH"), by its attorneys, hereby submits its comments on the Commission's Notice of Proposed Rulemaking in the above-referenced docket.¹

I. INTRODUCTION AND SUMMARY

The Commission has made a tentative decision to adopt permanent rules for automatic vehicle monitoring ("AVM"), which the FCC proposes to rename the Location and Monitoring Service ("LMS").² After twenty years, the time is right for a more definite regulatory structure for AVM, provided that it embodies considerable flexibility. Most importantly, those aspects of the existing interim AVM rules that

¹ *Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems*, 8 F.C.C. Rcd 2502 (1993) ("NPRM").

² AMTECH takes no position on this name change proposal. In these comments, AMTECH will use the new name when referring to the proposed rules. When referring to existing systems, the interim rules currently in effect (47 C.F.R. § 90.239), and the development of vehicle monitoring and identification services, AMTECH will use the term AVM.

have been successful in promoting competition and continuing technological development should be retained.

AMTECH supports a number of the Commission's tentative conclusions, particularly opening the entire 902-928 MHz band for LMS licensing. As a general matter, additional spectrum certainly will serve the public interest by accommodating many LMS systems. However, AMTECH believes that final rules should differ from

Second, final operational and technical regulations should be designed to facilitate sharing. For example, all local-area systems would operate under low height and power constraints. In addition, wide-area systems would be subject to significantly less restrictive height and power limitations and minimum standards of robustness. AMTECH details its proposals for such rules herein.⁴

Third, the Commission should adopt rules governing extended implementation. In certain situations an extended construction schedule is necessary to the implementation of large-scale and geographically distributed systems, even in a shared spectrum environment. The rules should provide for such circumstances.

Fourth, should the FCC determine that some "wide-area only" sub-bands should be created, existing local-area systems should not be displaced from the sub-bands. Not only would such forced migration be exceedingly costly, but even the leading proponents of wide-area only spectrum have proposed an indefinite grandfather period.⁵

II. STATEMENT OF INTEREST

AMTECH, founded in 1984 by a handful of former Los Alamos National Laboratory scientists, is the worldwide leader in the manufacture of AVM devices for

⁴ See *infra* pp. 17-20, 28-36.

⁵ Petition for Rulemaking filed by North American Teletrac and Location Technologies, Inc., RM No. 8013, at 35-36 (filed May 28, 1982); Comments of MobileVision in Support of Teletrac Petition for Rulemaking, RM No. 8013, at 17-18 (filed July 23, 1992).

transportation applications. Headquartered in Dallas, AMTECH conducts research and development, and engineering and manufacturing functions in a new 75,000 square foot facility in Albuquerque, New Mexico. It has offices, representatives and systems installed in over a dozen countries and scores of marketing and distribution agreements with established companies covering the entire world.⁶

AMTECH has pioneered a local-area monitoring technology -- "modulated backscatter"-- that provides the basis for broad application and is specified and endorsed by a host of user industry standards organizations.⁷ Today, AMTECH systems are serving over 1,000,000 vehicles (including transportation equipment), a substantial number of which rely on AMTECH equipment on a daily basis. Currently, AMTECH equips nearly 100,000 new vehicles per month.

AMTECH products make significant contributions in many areas. AMTECH technology has profoundly impacted five areas in particular: (1) traffic management and highway toll collection; (2) rail transport; (3) intermodal container transport; (4)

⁶ AMTECH technology has been proven around the globe. In addition to contributing to the safe and efficient management of mobile resources in this country, AMTECH's systems are a unique export opportunity for U.S. businesses. In 1992, approximately 28 percent of AMTECH's sales were to customers outside the United States. Promotion of international sales of high-technology components such as those manufactured by AMTECH is critical to improving the United States trade deficit.

⁷ The technology pioneered by AMTECH provides the basis for broad industrial use and is specified and endorsed by a host of intercompatible user industry standards organizations, such as the Association of American Railroads (AAR), the American Trucking Association (ATA), the American National Standards Institute (ANSI), and the International Standards Organization (ISO). A further description of the AMTECH technology is provided in Appendix A hereto.

trucking and fleet management; and (5) air transport.⁸ AMTECH's customers include the New York State Thruway Authority, the Oklahoma Turnpike Authority, all North American railroads (*e.g.*, Conrail, Norfolk and Southern, and Union Pacific), British Petroleum, the Port Authority of New York and New Jersey, the Los Angeles International Airport, the SNCF (the French National Railway), Queensland (Australia) Rail, and American President Lines, to name a few. In light of its commitment to the development and deployment of monitoring systems, AMTECH clearly has a vital interest in the Commission's LMS rulemaking.

III. AMTECH'S COUNTERPROPOSALS

AMTECH supports the Commission's proposal to make the entire 902-928 MHz band available to LMS systems. Similarly, there may be merit in the FCC's tentative decision to include the location of all inanimate and animate objects within the scope of LMS.⁹ While the *NPRM* would advance and ensure the continued and diverse development of monitoring systems, the proposals would not adequately meet the future spectrum needs of local-area systems nor maintain the same open and competitive environment as the interim rules. Indeed, the amount of spectrum that the Commission proposes to set aside for "wideband only" systems is wholly justified, and in

⁸ A more complete description of current and near future AMTECH technology applications is contained in Appendix A attached hereto.

⁹ See *NPRM* at 2503.

contravention of one of the *NPRM*'s principal goals of fostering "a competitive and dependable environment in which AVM systems can continue to develop."¹⁰





AMTECH therefore counter-proposes herein a regulatory scheme different than that outlined in the *NPRM* but which AMTECH believes will achieve the Commission's objectives in a manner that treats fairly all segments of the AVM industry. The centerpiece of this regime, like the current interim rules, is spectrum sharing.¹¹ Rather than merely opposing the announced proposal, AMTECH is accepting the Commission's invitation in the *NPRM* to "propos[e] alternative licensing schemes."¹² Indeed, the FCC expected "that licensees dedicated to operating cooperatively in a shared environment would be able to propose a method by which productive co-channel operations can be achieved."¹³ AMTECH believes that this expectation is well-founded.

Specifically, AMTECH submits that the FCC should (i) open the entire 902-928 MHz band for the operation of all IMS systems on a shared basis predicated on mutual

systems to share, certain accommodations in the AVM band plan may be needed. In that event, AMTECH proposes an alternative plan that would facilitate the deployment of wide-area systems requiring a comparative low noise environments while

available at 904-912 and 918-926 MHz for local-area licensing on a permanent basis.¹⁴ By proposing to withdraw 6 MHz from local-area systems, the *NPRM* would not leave enough spectrum for some existing operations, let alone the future needs of local-area AVM systems.

Depending on the type of application, AMTECH's AVM technology uses varying amounts of spectrum. Any single transmitter in the sort of "narrowband" reader/tag system typical of most of those AMTECH has installed to date requires approximately 20 kHz for its transmission. In a typical installation under the current rules, this signal is transmitted at approximately 2 watts effective radiated power (ERP)



In read-write systems (information passing in both directions between the location unit's tag and the reader), the transmitter also sends a modulated signal (i.e., writes) to the tag. The occupied bandwidth of this signal is approximately 2.5 MHz in currently deployed systems. The reflected signal returned by the tag has a bandwidth of similar magnitude. The power levels of a read-write system are comparable to those of a read-only operation.

Most sites require at least two separate readers using different frequencies, and some installations have 16 or more readers. Reliable operation of multiple readers within a given area requires that readers be separated in frequency and in some cases time multiplexed to avoid mutual interference and increase coverage. Specifically, when readers in read-only systems are relatively closely situated, separations of at least 1 to 2 MHz are desirable between adjacent readers depending upon site specific factors. Thus, for toll plazas, intermodal terminals, rail switch yards, and multiple, high speed applications such as highways, several MHz of total spectrum are required. Indeed, some toll plazas may require total bandwidth in excess of the 10 MHz to be made available for local-area systems under the *NPRM's* proposal.

Increasingly, local-area AVM applications are calling for high data rates and read-write capabilities. Correspondingly greater bandwidth is needed to meet these requirements. For example, the State of California has enacted a statute and related

¹⁶(...continued)
correct information is received from the tag. Accordingly, the bandwidth of the receiver must be relatively wide in order to capture enough of the modulated backscatter signal.

regulation¹⁷ that specify a *mandatory* standard for AVM for revenue collection purposes within the State of California. This requirement was adopted after two years of diligent and deliberate study and public hearings. Moreover, a host of AVM manufacturers and others have proposed this standard to the Federal Highway Administration in accordance with the Intermodal Transportation Efficiency Act of 1991 as the basis for a non-proprietary, open protocol national standard for vehicle-to-roadside communications. The U.S. Department of Transportation has asked Lawrence Livermore National Laboratories and the National Institute of Standards and Technology to evaluate the California standard as a potential national standard.

Pursuant to the statute and regulation described above, the California Department of Transportation ("CALTRANS") has recently issued a request for proposals ("RFP") to implement the California AVM standard for local-area systems, the Advanced Toll Collection and Accounting System ("ATCAS").¹⁸ The CALTRANS standard specifies a data rate that AMTECH has determined will require a single local-area reader to employ a "channel" that is approximately 6 MHz wide.¹⁹

Under the *NPRM*, the ATCAS system and similar systems would have available to them two 2 MHz and one 6 MHz sub-bands. Given the bandwidth requirements, only one channel will be available for such installations, which will seriously constrain, implementation, the development and reliability of ATCAS and other similar high-data-rate systems.

The constraints will occur for two reasons. First, the availability of only one channel effectively creates a potential "single point of failure." Thus, should RF interference be caused to another user operating in the 912-918 MHz band, moving the ATCAS operation to another channel would not be a viable option to resolve the interference.²⁰

The second restriction imposed by the availability of only one channel for high data systems is that it will complicate the ability to handle nearby, but operationally separate customer installations. Examples of such installations could be a traffic monitoring system (using readers in the vicinity of the toll plaza), parking lots in the

¹⁹(...continued)

monitoring system that is compliant with the mandatory CALTRANS AVM specification set forth in the ATCAS RFP.

²⁰ The Commission's proposed band plan will also restrict the flexibility narrowband local-area AVM operators will have to meet changing frequency environments. The *NPRM* assumes that all or virtually all of the "narrowband" spectrum will be available. However, the FCC's proposal could subject some other narrowband local-area systems to an increased risk of interference from Part 15 devices, which may be forced to relocate from the entire band to the 10 MHz set aside for local-area systems in order to avoid interfering with some extremely fragile wide-area systems. The net result may be an increased likelihood of interference from Part 15 devices, the most efficient solution to which would be a switch in frequencies due to the common difficulty of locating the source of Part 15 interference. Availability of only one 6 MHz channel -- in the center of the band -- may also constrain the deployment of local-area wideband systems in areas that may be subject to ISM interference from equipment operating at 915 MHz. Thus, it may prove difficult to situation IVHS facilities where they are needed most.

vicinity of the toll plaza, a portable reader used by law enforcement personnel or for vehicle emission monitoring, and a satellite plaza (typically within 1,000 feet from the main toll plaza). While it may be technically feasible to implement time division multiplexing, a single channel will not accommodate the data rate required.²¹

Three 6 MHz bands would also be optimal for an installation like the Oakland Bay Bridge in California -- where the channels would be used by the main plaza, satellite locations and portable readers. This would allow the system to process very quickly the toll transactions, as required to properly control the video system that records violators' license plates. It would also provide flexibility if, for some unforeseen reason, harmful interference were to prohibit operation within a portion of the band.²²

High data rate local-area systems such as that adopted by CALTRANS and under consideration by the U.S. Department of Transportation as a national standard,

²¹ One of the purposes of local-area systems (including ATCAS) is to reduce congestion. This is accomplished by collecting toll revenue and obtaining traffic management data from vehicles moving at highway speeds. A toll collection system is only viable if it is enforceable and does not encourage mass disobedience. Enforcement of tolls requires that the location of individual vehicles be determined precisely (within an uncertainty of no more than 10 feet), and that the transaction be linked unambiguously to a particular vehicle. Thus, for any given lane of traffic, transactions can take place in no more time than about 100 milliseconds. To the extent that any simple transaction required less than 100 ms, time division multiplexing can be used to share a single channel. While simple vehicle identification typically requires less than 300 bits of data, systems that require encryption and/or transactions that interact with the tag on a two-way communications basis can easily require 4000 bits of data. For 20 lanes in close proximity the overall data rate required is $20 \times 4000 \div 0.1 = 800,000$ bps. Because a single channel is specified at 300 kbps under the CALTRANS standard, three channels will be needed to meet the required data rate. RFP § III-4.

²² For example, the portable readers could use the noisiest channel position, since they are not used for high data rates of transfer and are not frequently "turned on," leaving the two other channels available for fixed operation. If need be, the satellite plaza channel could be swapped for the toll channel pending resolution of interference problems.

which require large bandwidths, will become more and more common in the near future. Wideband spectrum is also needed for other local-area systems that will employ read-write tags in which the bandwidth of the writing signal (i.e., reader-to-tag) is more than 2 MHz. The *NPRM*, however, would relegate all such systems to the 6 MHz sub-band 912-918 along with virtually any other local-area user of a wideband technology. As the above discussion shows, such systems would have available only one channel under the *NPRM*, making reliable implementation difficult in many circumstances. Moreover, data rates requiring more than 6 MHz of spectrum in a local-area system would not be possible at all under the proposed rules. In short, the *NPRM* fails to provide for existing and near term local-area AVM needs or for reasonably foreseeable future needs of local-area AVM systems.

B. The Amount of Spectrum That the *NPRM* Would Reserve for "Wideband" Systems Only Is Unjustifiable

Not only would the *NPRM*'s proposed band plan fail to provide enough spectrum for local-area systems, it would set aside too much for wide-area systems' "exclusive" use. It is far from clear that 8 MHz "wideband-only" allocations would be justified. The Commission has inquired "whether pulse-ranging LMS systems require eight megahertz and, if not, what minimum amount of spectrum is necessary to operate such a system."²³

²³ *NPRM* at 2505.

The answer to the first question would appear to be no in some cases. North American Teletrac and Location Technologies, Inc. ("PacTel") has conceded that its pulse-ranging HML systems require only 4 MHz of spectrum,²⁴ and Southwestern Bell has indicated that it will use less than 4 MHz (as little as 2 MHz for the wideband pulse).²⁵

Conversely, while Pinpoint Communications, Inc., another pulse-ranging HML advocate, would like to use additional spectrum -- up to the entire 26 MHz -- it explains that it can do so while sharing with so-called "narrowband" systems.²⁶ Accordingly, its proposed spectrum use should not affect any "wideband-only" allocation the FCC might consider because its system design has obviated the need for any degree of segregation. No other wideband HML system designer, to date, has provided sufficient information to permit evaluation of their true bandwidth requirements.²⁷ As a result, the answer to the *NPRM's* second inquiry concerning wideband-only spectrum seems to be no more than 4 MHz.

²⁴ Response of PacTel to the Missile Group Old Crows, RM No. 8013, at 12 (filed Jan. 14, 1993). PacTel claims that future versions of its system will require 8 MHz.

²⁵ Comments of Southwestern Bell Corp., RM No. 8013 at 3 (filed July 23, 1992) ("SW Bell Comments"); Application of Southwestern Bell Mobile Systems Inc. for Private Land Mobile Radio Service License (filed Dec. 23, 1992) (File No. 346790) ("SW Bell Application") (seeking 2 MHz assignment for wide-area system).

²⁶ Opposition of Pinpoint Communications, Inc., RM No. 8013, at 5, 29-30 (filed July 23, 1993) ("Pinpoint Opposition").

²⁷ While MobileVision and PacTel both have wide-area system licenses and participated in RM 8013, neither of them disclosed such data regarding their intended operations. Neither licensee has any operational commercial systems, to the best of AMTECH's knowledge.

The Commission also tentatively concluded that no licensees should be granted exclusivity.²⁸ AMTECH agrees. However, the Commission sought comment on whether existing "wideband," i.e., wide-area, licensees under the interim AVM rules should be permitted to enjoy exclusivity for a limited period under permanent LMS rules.²⁹ In AMTECH's view, the answer is absolutely not.

The beneficiaries of such status, once granted, will fight aggressively to maintain it. The principal beneficiaries of such a policy of retroactive exclusivity are easily identified. They would be PacTel in the 904-912 MHz sub-band and MobileVision in the 918-926 MHz sub-band, as these two parties are already licensees in these sub-bands for a combined total of well over one thousand sites, including locations in all of the top 50 markets.³⁰ PacTel has commercial operational systems in only a handful of cities, (MobileVision has none) and granting this limited exclusivity would, in effect, allow them to "warehouse" amounts of spectrum. Moreover, both parties, and PacTel in particular, have been engaged recently in an aggressive paper campaign predicated on an interpretation of the current rules that the FCC has explicitly rejected (most recently in the *NPRM*), to dissuade other parties from applying for AVM licenses sharing the spectrum to which they have been

²⁸ *NPRM* at 2505-06.

²⁹ *Id.* at 2506. The Commission has not explained how it would assign the "wideband" licenses under permanent LMS rules in those markets where it already has assigned three or more "wideband" systems or where there are pending "wideband" applications for markets in which there are already two or more licensees.

³⁰ See Reply Comments of Pinpoint, RM No. 8013, att. A (filed Aug. 7, 1992).

assigned.³¹ Accordingly, exclusivity, even if temporary, would probably confer nationwide duopoly status on these two providers if existing wide-area licensees are given any sort of priority over "newcomers."³² Such an action would have a chilling effect on the LMS industry as a whole, stifling investment and development in new and advanced LMS technologies, fencing-out competition, and artificially constraining consumer choice.

³¹ See, e.g., Petitions to Deny of Ameritech (MobileVision), File Nos. 295053 and 295060 (filed Aug. 21, 1992) ("Missouri Pacific Objection"); PacTel Petition to Deny Applications of Pinpoint Communications, Inc., File Nos. 347483-347502 (filed Mar. 17, 1993); PacTel Petition For Reconsideration, File No. 342513 (filed Mar. 17, 1993); PacTel Application for Review, File Nos. 342513 etc. (filed May 23, 1993) ("Review Application"). The many self-styled "petitions to deny" filed by MobileVision and PacTel have not been authorized by the FCC's rules. See 47 C.F.R. §§ 1.962 and 1.971 (1992). Moreover, as AMTECH and others have explained elsewhere, many of these pleadings have been plagued by other procedural deficiencies and the absence of the factual predicate of even possible interference. See, e.g., Consolidated Opposition of the Missouri Pacific Railroad to the Objections of MobileVision, File Nos. 295053 and 295060 (filed Sept. 3, 1992) (MobileVision lacked standing to make the Missouri Pacific Objection with respect to File No. 295060 because the application sought only frequencies that MobileVision is not authorized to use anywhere); AMTECH Opposition to PacTel Application for Review, File Nos. 342513 etc. (filed June 9, 1993) (the Review Application was untimely filed or grossly premature with respect to all of the files at issue; PacTel improperly sought review of a license not yet granted (Vulcan Chemicals Inc.); PacTel sought review of a license authorized to operate only on frequencies not used by PacTel (Salt Lake City Airport Authority)).

³² See NPRM at 2506 (under the FCC's alternative plan for wideband-only sub-bands, after a period of temporary exclusivity, newcomers "would be required to protect any previously licensed co-channel wideband stations"). What makes exclusivity in the 902-928 MHz band even more egregious is that, between them, PacTel currently has only a handful of commercial systems constructed, and MobileVision none.

C. AMTECH's Preferred Band Plan

1. The Commission Should Open The Entire 902-928 MHz Band To All LMS System Types.

The Commission proposes that only "pulse-ranging" systems requiring between 2 and 8 MHz be licensed in the 904-912 MHz and 918-926 MHz sub-bands. Local-area and any other systems would be authorized to use only the 902-904, 912-918, and 926-928 MHz bands. Given the demands for spectrum for local-area systems, as described above, this band plan does not afford sufficient spectrum or incorporate sufficient flexibility into LMS licensing in the 902-928 MHz band. In order to meet the requirements of local-area systems and not handicap regulatorily any particular type of system or technology -- existing, under development, or not yet conceived -- LMS operators should be permitted to apply for the use of any frequencies in the 902-928 MHz band. Of course, individual transmitters should continue to be licensed on specific frequencies to facilitate coordination and spectrum sharing.

The power and height limits under the proposed full-sharing plan would be as follows:

- Local-area system base stations would be restricted to 30 W ERP at a height of 10 meters above ground;³³

³³ Local-area systems could alternatively demonstrate compliance by meeting a field strength limit of 40 dBmV/m measured 2 meters above ground at a distance of 0.5 miles from the transmitting site. Such an alternative approach will facilitate the use of higher ERP facilities installed in the ground between dual sets of railroad tracks. In-ground systems of this type have been developed recently to
(continued...)

- Local-area mobiles would be limited to 1 W ERP;
- Local-area highway beacons³⁴ would be limited to 100 W ERP and operation in the 902-906 and 924-928 MHz sub-bands;
- Wide-area base stations would be limited to operations of at least 2 MHz in bandwidth and 625 W ERP per MHz up to a maximum of 5 kW ERP.³⁵
- Wide-area mobiles would be limited to 50 W ERP.³⁶

The band plan and associated power limits are depicted in Figure 1.

The principal result and benefit of open access to the expanded LMS band, as set forth in AMTECH's proposal, is that licensees would have maximum flexibility in selecting and requesting frequencies for their operations, so as to avoid or resolve perceived interference problems with existing stations. The principal drawback of the

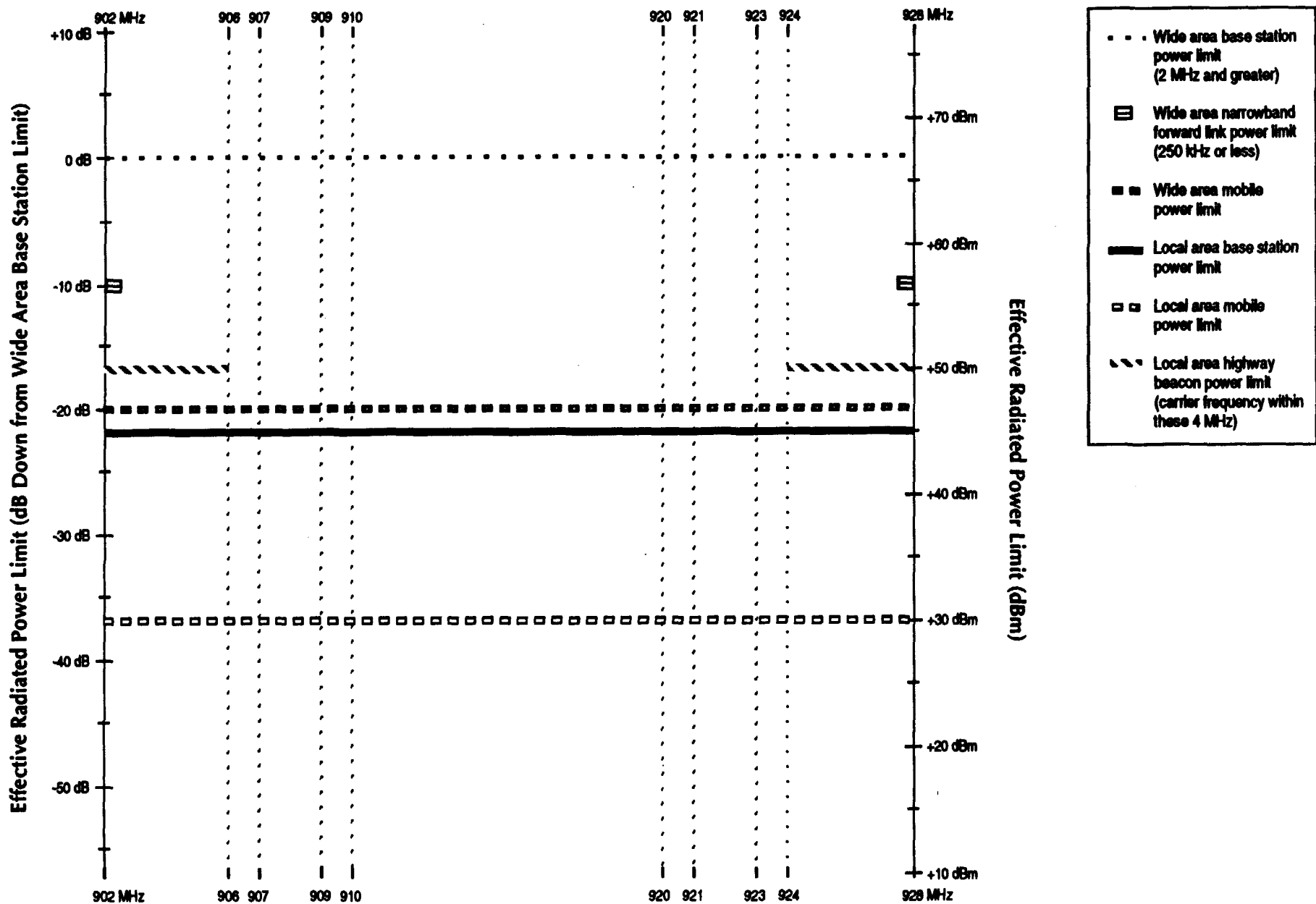
³³(...continued)

serve such multi-track environments in locations in which conventional pole mounted antennas are not practical. Installations of this type are expected to be relatively rare and most likely to be found in rural areas. The ERP from such in-ground antennas could exceed 30 watts but would produce a field at one-half mile that is no greater than that produced by a 30 watt ERP facility at 10 meters above ground.

³⁴ The CALTRANS RFP for ATCAS calls for roadside beacons that would locate and monitor vehicles on a multi-lane highway (without regard to lanes) in the vicinity of the beacon. The beacons would also transmit information to the passing vehicles. Because of increasing concerns with the use of overhead gantries on highways, the beacon transmitters would most likely be located on poles placed outside of the roadside shoulders, and power could be adjusted downward to accommodate actual installations. A single beacon, however, needs to provide service to up to 8 lanes of highway. While the authorized bandwidth of the highway beacons would be 6 MHz, the carrier frequency would fall within these 4 MHz sub-bands.

³⁵ Wide-area forward links would also be permitted to operate at a maximum of 500 W ERP in the 902.000-902.250 and 927.750-928.000 MHz sub-bands. See *infra* p. 32.

³⁶ In order to provide local-area systems with a reasonable degree of protection from wide-area mobiles, each such mobile should be limited to a single transmission of 10 ms or less in any 100 ms period. See *infra* pp. 33-34.



**Figure 1: Proposed Power Limits for LMS Systems
in the 902-928 MHz Band (Preferred Plan)**

proposal outlined in the *NPRM* is that it separates LMS system types into two classes, namely "pulse-ranging" HML systems and non-HML systems, and assumes that this is meaningful in terms of the spectrum required by each type of system. While this separation may be roughly accurate from an operational standpoint,³⁷ it is not

reader/tag systems already deployed, for example, to the extent it deemed necessary. Moreover, systems employing spread spectrum techniques could spread over up to 26 MHz, increasing throughput significantly while diminishing susceptibility to interference from narrower signals.³⁸ Further, experience suggests that the operation of diverse AVM systems throughout the entire band can be managed, and that reasonable cooperation among licensees can resolve any interference problems that do arise.

Contrary to the preliminary impression of the FCC as set forth in the *NPRM*, the co-existence of wide-area and local-area systems is quite feasible and practical. Local-area AVM operations generally occur over a very small area and occur at relatively low power and low antenna heights (often with antennas directed downward). While this may lead to small "black out" areas around the reader for wideband wide-area systems designed with a reasonable level of robustness,³⁹ these "black out" regions will only persist for as long as the readers are transmitting. AMTECH readers, for example, can transmit only when a proximity sensor alerts that a vehicle is approaching, generally for between 6 and 100 ms total. Thus, a typical reader would

³⁸ Pinpoint Communications reports in its Opposition that it is in the latter stages of developing a robust HML system capable of spreading over much, if not all, of the 902-928 MHz band. Pinpoint Opposition at 3-6. AMTECH's proposal for an open-ended band-sharing plan would accommodate novel approaches such as these, while the *NPRM* plan would not.

³⁹ See *infra* p. 34, for discussion of possible robustness requirements for wide-area systems operating in shared spectrum.

be making hundreds or even thousands of reads per day but turned on for only a minute fraction of the total time.

Under the AMTECH band plan, the ability of wideband systems to account for potential narrowband signals beforehand will be enhanced because of the fact that readers are stationary.⁴⁰ Moreover, PacTel has noted that the interfering effects of at least a "single narrowband intervening signal at a known frequency can be alleviated at *nearby* wideband spread-spectrum receivers through the use of narrowband filters, noise cancelers, or skip channel techniques in frequency hopping/spread spectrum systems."⁴¹ Other techniques exist as well. For instance, if wide-area system mobiles utilize higher powers, the purported potential interference effects of low-power local-area systems surely will decline in terms of geographic coverage. A similar result could be achieved through the strategic situating of fixed receivers. Further, wide-area systems might employ some directional antennas on fixed receive sites to minimize black-out areas. Another way to overcome interference from local-area systems is retransmission by the vehicle once it is outside the immediate vicinity of the local-area installation.

⁴⁰ AMTECH has also developed portable reader systems. These systems, for example, are useful in stock or rail yards for inventory purposes or in certain emergency situations. While mobile, it can be expected that, at any one time, these would represent only a small fraction of reader systems and that their geographic area of operation would be relatively confined, so as to be almost as easily accounted for from an interference protection standpoint as stationary readers.

⁴¹ Affidavit of Dr. Charles L. Jackson at ¶ 23 (dated Apr. 6, 1993) (attached to PacTel's Application For Freeze, PR Docket No. 93-61, RM 8013, att. B (filed May 21, 1993)) ("Jackson Affidavit").

Accordingly, LMS licenses should be granted and renewed with the express understanding that licensees are required to cooperate in good faith to resolve situations of harmful interference.⁴² The open nature of the allocation will create incentives for more efficient use of the spectrum and for technological advancements improving robustness and electromagnetic compatibility. From a market perspective, in a fully shared regime, new entrants will not be foreclosed from the band and existing licensees are more likely to innovate, giving consumers more choices and allowing them to determine which systems and technologies succeed. Moreover, the increased competition facilitated by open entry will tend to keep prices for AVM systems and services lower, a result certain to benefit the public.

2. Sharing Would Be in the Public Interest.

Undoubtedly, some parties will suggest that permanent LMS rules should dispense with sharing. However, AMTECH submits that this central tenet of the current rules should be retained under permanent rules. Since 1974, monitoring systems of all types have operated under interim AVM regulations on a shared basis in the 904-912 and 918-926 MHz bands.⁴³ Because of this flexible regulatory structure,

⁴² See 47 C.F.R. § 90.173(b); *Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them*, 7 F.C.C. Rcd 8105, 8177 (1992) (proposed § 88.171(b)) ("*Replacement of Part 90*").

⁴³ Compare 47 C.F.R. § 90.173(a) (all private land mobile assignments are on a shared basis unless explicitly provided otherwise) with *id.* § 90.239 (AVM rules do not explicitly provide for exclusive use). See also *NPRM* at 2504 n.29. Further, in licensing AVM operations under the existing rules, the Commission has never employed the sorts of procedures typical of those associated with

(continued...)